

CLAIMS

What is claimed:

1. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear;

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for transferring engine power from said input shaft to said output shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle, said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft;

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes belt drive means, chain drive means, and gear drive means; and

said vehicle also includes transmission means for receiving engine power and providing various output ratios of engine power, said transmission means disposed between said engine and said power transfer device so as to receive engine power from said rear power output and deliver selected ratios of said rear power output to said input shaft of said power transfer device.

2. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear;

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for

transferring engine power from said input shaft to said output shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle, said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft;

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes belt drive means, chain drive means, and gear drive means; and

said means for transferring power is a gear drive means, and said gear drive means includes means for changing from one input/output rotation ratio to another input/output rotation ratio.

3. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear;

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for transferring engine power from said input shaft to said output shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle, said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft;

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes belt drive means, chain drive means, and gear drive means; and

said chain drive steps power from an upper part of said casing to a lower part of said casing, and said gear drive means includes means for changing from one input/output rotation ratio to another input/output rotation ratio.

4. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear, said vehicle also includes a drive shaft connected to a differential unit in the rear of the vehicle, said differential unit is connected to rear wheels of said vehicle, said vehicle having a frame, said frame having a suspension system supporting said rear wheels, whereby said wheels can move vertically with respect to said frame, said differential unit is a half-shaft differential unit immovably supported by said frame and opposed swing axles extend from said differential unit, said vehicle has a load floor at least a first portion of which is flat and disposed over said drive shaft, said first load floor portion defining a horizontal plane, said suspension system allows axles of said rear wheels to move vertically to positions above said first load floor portion plane;

said vehicle also includes a low profile differential unit and a step-up gear drive unit connects outer ends of said swing axles to rear wheels of said vehicle;

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part

for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for transferring engine power from said input shaft to said output shaft, said output shaft of said power transfer device is connected to said drive shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft; and

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes belt drive means, chain drive means, and gear drive means, said power transfer casing is vertically immovably supported by said frame.

5. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear, said vehicle also includes a drive shaft connected to a differential unit in the rear of the vehicle, said differential unit is connected to rear wheels of said vehicle, said vehicle having a frame, said frame having a suspension system supporting said rear wheels, whereby said wheels can move vertically with respect to said frame, said differential unit is a half-shaft differential unit immovably supported by said frame and opposed swing axles extend

from said differential unit, said vehicle has a load floor at least a first portion of which is flat and disposed over said drive shaft, said first load floor portion defining a horizontal plane, said suspension system allows axles of said rear wheels to move vertically to positions above said first load floor portion plane;

said suspension system includes first and second trailing arms pivotally mounted outboard of said load floor on opposite sides thereof, a torsion box including first and second transverse beam members secured between the first and second trailing arms beneath said load floor, a first plate attached to said first and second transverse beams adjacent said first trailing arm, a second plate attached to said first and second transverse beams adjacent said second trailing arm and spaced from said first plate, a first cross beam secured to said first transverse beam substantially adjacent said first plate and secured to said second transverse beam substantially adjacent said second plate, a second cross beam secured to said second transverse beam substantially adjacent said first plate and secured to said first transverse beam substantially adjacent said second plate, a first air spring compressed between said first plate and said load floor urging said load floor upward from said torsion box, a second air spring compressed between said second plate and said load floor urging said load floor upward from said torsion box, and first and second wheel support members extending upwardly of said first and second trailing arms respectively and each support member having a wheel axis supporting a portion of a wheel above said load floor;

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for transferring engine power from said input shaft to said output shaft, said output shaft of said power transfer device is connected to said drive shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft; and

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes

belt drive means, chain drive means, and gear drive means, said power transfer casing is vertically immovably supported by said frame.

6. A vehicle having a front engine and a rear drive, comprising:

a vehicle having a length with a front and a rear, said vehicle also includes a drive shaft connected to a differential unit in the rear of the vehicle, said differential unit is connected to rear wheels of said vehicle, said vehicle having a frame, said frame having a suspension system supporting said rear wheels, whereby said wheels can move vertically with respect to said frame, said differential unit is a half-shaft differential unit immovably supported by said frame and opposed swing axles extend from said differential unit, said vehicle has a load floor at least a first portion of which is flat and disposed over said drive shaft, said first load floor portion defining a horizontal plane, said suspension system allows axles of said rear wheels to move vertically to positions above said first load floor portion plane;

said suspension system is disposed beneath said load floor and includes a pair of trailing arms pivotally supported on respective ends of braces outboard of said load floor and extending rearwardly relative to said vehicle, torsion box means transversely extending under said load floor and supporting said trailing arms, air spring means disposed between said torsion box and said load floor to urge separation thereof, and wheel support means extending from respective ones of said trailing arms and including an axle at a rolling centerline not substantially below said first load floor portion plane.

a longitudinally mounted engine in the front of said vehicle, said engine having a rear power output;

a power transfer device mounted behind said rear power output of said longitudinally mounted engine, said power transfer device including a casing having a front face, a rear face, an upper part and a lower part, said front face being oriented towards said engine;

input means in the upper part of said casing front face for receiving power from said rear power output of said engine, said input means is a rotatably mounted input shaft passing through the front face of said casing, said input shaft has an outer part for receiving power from said engine, said input shaft has an inner part inside said casing, and said inner part supports a part of said means inside said casing for transferring engine power from said input shaft to said output shaft, said output shaft of said power transfer device is connected to said drive shaft;

output means in the lower part of said casing rear face for supplying power to the rear of said vehicle said output means is a rotatably mounted output shaft, said output shaft has an outer part for supplying power towards the rear of said vehicle, said output shaft has an inner end inside said casing, and said inner end supports another part of said means inside said casing for transferring engine power from said input shaft to said output shaft; and

means inside said casing for transferring engine power from said input means to said output means, said means inside said casing for transferring engine power includes

belt drive means, chain drive means, and gear drive means, said power transfer casing is vertically immovably supported by said frame.

7. The vehicle of Claim 6 wherein:

said torsion box includes first and second transverse beam members secured between the first and second trailing arms beneath said load floor, a first plate attached to said first and second transverse beams adjacent said first trailing arm, a second plate attached to said first and second transverse beams adjacent said second trailing arm and spaced from said first plate, a first cross beam secured to said first transverse beam substantially adjacent said first plate and secured to said second transverse beam substantially adjacent said second plate, a second cross beam secured to said second transverse beam substantially adjacent said first plate and secured to said first transverse beam substantially adjacent said second plate, a first air spring compressed between said first plate and said load floor urging said load floor upward from said torsion box, a second air spring compressed between said second plate and said load floor urging said load floor upward from said torsion box, and first and second wheel support members extending upwardly of said first and second trailing arms respectively and each support member having a wheel axis disposed not substantially below said load floor, said torsion box providing lateral and longitudinal rigidity to said suspension system and permitting independent wheel movement by torsional displacement along said first and second transverse beams.

8. The vehicle of Claim 7 wherein said vehicle also includes a low profile differential unit and a step-up gear drive unit connects outer ends of said swing axles to rear wheels of said vehicle.